WHAT IS CLAIMED IS:

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1. A method of measuring the distance between first and second proximately disposed electrically conductive surfaces, the method comprising:

(a) measuring a force exerted between the first and second surfaces to obtain an exerted force value; and

(b) determining a separation distance between the first and second surfaces as a function of the exerted force value measured in step (a).

2. The method of claim 1 employed to measure distances between proximately disposed electrically conductive surfaces within a disc drive.

3. The method of claim 1 wherein the first surface is a surface of a disc employed in a disc drive, and wherein the second surface is a surface of a slider of the disc drive.

4. The method of claim 1 wherein the first and second surfaces are substantially flat surfaces that are disposed substantially parallel to each other, wherein measuring step (a) comprises measuring an attractive force between the first and second surfaces to obtain an attractive force value and wherein determining step (b) comprises determining a separation distance between the first and second surfaces as a function of the attractive force value.

5. The method of claim 4 wherein determining step (b) comprises determining the separation distance using the relation:

$$d = \sqrt[4]{\frac{A\pi^2 \bar{h} c}{240F}}$$

where F is the attractive force value, A is the area of the smaller of the first and second surfaces, $\bar{h}$ is Planck's constant, c is the speed of light, and d is the separation distance.

6. The method of claim 1 wherein further comprising steps (c), (d) and (e), performed between measuring step (a) and determining step (b), steps (c), (d) and (e) comprising:

(c) changing the distance between the first and second surfaces from the separation distance to be determined to a second separation distance, the separation distance to be determined differing from the second separation distance by a known amount, Δd;

(d) measuring the force exerted between the first and second surfaces to obtain a second exerted force value; and

(e) subtracting the second exerted force value from the exerted force value to obtain a change-in-force value, ΔF;

wherein determining step (b) comprises determining the separation distances as a function of Δd, ΔF and the exerted force value.

7. The method of claim 6 wherein the first and second surfaces are substantially flat surfaces that are disposed substantially parallel to each other, wherein measuring step (a) comprises measuring the Casmir attractive force between the first and second surfaces at the first separation distance to obtain a first attractive force value, measuring step (d) comprises measuring the attractive force between the first and second surfaces at the second separation

distance to obtain a second attractive force value, wherein subtracting step (e) comprises subtracting the second attractive force value from the first attractive force value to obtain a change-in-force value, ΔF, and wherein determining step (b) comprises determining a value the first separation distance as a function of Δd, ΔF and the first attractive force value.

8. The method of claim 7 wherein determining step (b) comprises determining a value of the first separation distance using the relation:

$$d = \sqrt[4]{\frac{\Delta F(\Delta d)^4}{F}}$$

where d is the value of the separation distance to be determined and F is the attractive force value corresponding to the separation distance to be determined.

9. A method of determining the degree to which the shape of a first electrically conductive surface varies from a nominal shape, the method comprising steps of:

(a) holding the first surface a known separation distance from a second electrically conductive surface having a known shape;

(b) measuring the force exerted between the first and second surfaces to obtain a measured exerted force value; and

(c) comparing the measured exerted force value to a nominal force value that would be expected to be exerted between the first and second surfaces as a result of the Casimir force if the shape of the first surface were equivalent to the nominal shape, to obtain a difference between the measured exerted force value and the nominal force value.

10. The method of claim 9 wherein the first surface is a surface of a disc employed in a disc drive.

11. The method of claim 9 wherein the first and second surfaces are substantially flat surfaces that are disposed substantially parallel to each other, wherein the nominal shape is a flat surface, wherein measuring step (b) comprises measuring the attractive force between the first and second surfaces to obtain an attractive force value and wherein the nominal force value is a value of an attractive force that would be expected to be exerted between the first and second surfaces as a result of the Casimir force if the first surface was the nominal flat surface.

12. The method of claim 11 wherein the nominal force value is calculated using the relation:

$$F = \frac{A\pi^2 \bar{h} c}{240 d^4}$$

where F is the nominal force value, A is the area of the smaller of the first and second surfaces, $\bar{h}$ is Planck's constant, c is the speed of light, and d is the separation distance.

13. The method of claim 9 wherein the first surface is a substantially spherical surface and the second surface is a substantially flat surface.

14. The method of claim 9 further comprising steps of:

(d) if the difference between the measured exerted force value and the nominal force value is greater than a predetermined threshold amount, classifying the first surface as a failing surface; and

(e) if the difference between the measured exerted force value and the nominal force value is less than or equal to the predetermined threshold amount, classifying the first surface as a passing surface.

15. The method of claim 9 further including steps (d) and (e), performed prior to step (c), of:

(d) if the first and second surfaces are not in contact with each other, moving the first surface closer to the second surface, to a new known separation distance; and

(e) repeating measuring step (b) and moving step (d) until the first and second surfaces are in contact with each other;

wherein comparing step (c) comprises comparing the last exerted force value measured prior to the first and second surfaces contacting each other to a nominal force value that would be expected to be exerted between the first and second surfaces as a result of the Casimir force if the shape of the first surface were equivalent to the nominal shape.

16. The method of claim 9 wherein the first surface resides on a first side of a first object and the second surface resides on a first side of a second object and wherein measuring step (b) comprises measuring the force with a piezoelectric transducer affixed to one of a second side of the first object and a second side of the second object.

17. The method of claim 9 wherein the first surface is a test surface of a rotating disc, and wherein a plurality of force measurements are performed between the test surface and the second surface to obtain a plurality of measured exerted force values instead of step (b), and wherein defects in the test surface are determined by comparing each one of the plurality of the measured exerted force values with a different one of the plurality of measured exerted force values instead of step (c).

18. An apparatus for determining the degree to which the shape of a first electrically conductive surface varies from a nominal shape, the apparatus comprising:

an electrically conductive test surface having a known shape;

a grasping member that holds the first surface a known distance from the test surface;

a force gauge that measures the force exerted between the first surface and the test surface to obtain a measured exerted force value; and

a processor adapted to compare the measured exerted force value to a nominal force that would be expected to be exerted between the first surface and the test surfaces as a result of the Casimir force if the shape of the first surface were equivalent to the nominal shape.

19. The apparatus of claim 18 wherein the first surface resides on a first side of a first object and the test surface resides on a first side of a test object and wherein the force gauge comprises a piezoelectric transducer affixed to one of a

second side of the first object and a second side of the test object and adapted to produce an electrical signal based on an amount of stress undergone by the transducer.

20. An apparatus for measuring the distance between first and second proximately disposed electrically conductive surfaces, the apparatus comprising:

measuring means for measuring the force exerted between the first and second surfaces to obtain an exerted force value; and

processor means for determining a separation distance between the first and second surfaces as a function of the exerted force.

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